CLAIMS

What is claimed is:

1. A method of coding information for transmission over a communication channel, said method comprising:

5   generating a transmit sequence comprising a plurality of transmit symbols based on an input sequence comprising a plurality of input symbols by differentially coding selected bits of said input sequence to produce one or more differentially coded bits in said transmit sequence.

10   2. The method of claim 1 wherein differentially coding selected bits of said input sequence to produce one or more differentially coded bits in said transmit sequence comprises differentially coding one or more bits of a first input symbol with respect to one or more bits from one or more previous input symbols.

15   3. The method of claim 2 wherein differentially coding one or more bits of said first input symbol with respect to one or more bits from one or more previous input symbols comprises differentially coding at least one protected bit of said first input symbol.

4. The method of claim 3 wherein differentially coding said at least one protected bit of said first input symbol comprises differentially coding said at least one protected bit of said first input

20   symbol with respect to a less protected bit of a previous transmit symbol.

5. The method of claim 2 wherein differentially coding one or more bits of a first input symbol with respect to one or more bits from one or more previous transmit symbols comprises

25   differentially coding at least one unprotected bit of said first input symbol.

6.   The method of claim 5 wherein differentially coding at least one unprotected bit of said first input symbol comprises differentially coding said unprotected bit of said first input symbol with respect to a protected bit of a previous transmit symbol.

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7.   The method of claim 1 further comprising generating said input sequence based on an information sequence.

8.   The method of claim 8 wherein generating said input sequence based on said information sequence comprises channel coding bits of said information sequence to produce a coded sequence.

9.   The method of claim 8 wherein channel coding bits of said information sequence to produce said coded sequence comprises error coding said information sequence using an unequal error protection scheme.

10.   The method of claim 8 wherein generating said input sequence based on said information sequence further comprises interleaving bits of said coded sequence to produce said input sequence.

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11.   The method of claim 10 wherein interleaving bits of said coded sequence to produce said input sequence comprises diagonally interleaving bits of said coded sequence to produce said input sequence.

12.   The method of claim 1 further comprising modulating a carrier with said transmit

sequence to produce a transmit signal.

13.   A method of decoding a received sequence comprising:

differentially decoding a received sequence comprising a plurality of received symbols to

generate an output sequence comprising a plurality of output symbols, said

5   received sequence having one or more differentially coded bits.

14.   The method of claim 13 further comprising demodulating a received signal to generate

said received sequence.

10   15.   The method of claim 14 wherein demodulating said received signal to generate said

received sequence and differentially decoding said received sequence to generate said output

sequence are performed jointly in an equalizer.

16.   The method of claim 13 further comprising channel decoding said output sequence to

15   generate a decoded sequence.

17.   The method of claim 16 wherein demodulating a received signal to generate said

received sequence comprises demodulating said received signal using re-encoded bits fed back

from a channel decoder as pilot bits.

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18.   The method of claim 17 further comprising outputting said re-encoded bits from said

channel decoder.

19.   The method of claim 17 further comprising re-encoding said decoded sequence to

25   produce said re-encoded bits.

20.   The method of claim 13 wherein differentially decoding said received sequence

comprising said plurality of received symbols to generate said output sequence comprising said

plurality of output symbols comprises differentially decoding one or more bits of a first received

5   symbol with respect to one or more bits from one or more previous received symbols.

21.   The method of claim 20 wherein differentially decoding one or more bits of said first

received symbol with respect to one or more bits from said one or more previous received

symbols comprises differentially decoding at least one protected bit of said first received

10   symbol.

22.   The method of claim 21 wherein differentially decoding said at least one protected bit of

said first received symbol comprises differentially decoding said at least one protected bit of

said first received symbol with respect to a less protected bit of a previous received symbol.

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23.   The method of claim 20 wherein differentially decoding one or more bits of said first

received symbol with respect to one or more bits from said one or more previous received

symbols comprises differentially decoding at least one unprotected bit of said first received

symbol.

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24.   The method of claim 23 wherein differentially decoding said at least one unprotected bit

of said first received symbol comprises differentially decoding said unprotected bit of said first

received symbol with respect to a protected bit of a previous received symbol.

25. An apparatus for coding an input sequence to generate a transmit sequence, said apparatus comprising:

a differential coder to generate a transmit sequence comprising a plurality of transmit symbols based on an input sequence comprising a plurality of input symbols by

5   differentially coding selected bits of said input sequence to produce one or more differentially coded bits in said transmit sequence.

26. The apparatus of claim 25 wherein said differential coder differentially codes one or more bits of a first input symbol with respect to one or more bits from one or more previous

10   transmit symbols.

27. The apparatus of claim 26 wherein said differentially coded bits comprise at least one protected bit.

15   28. The apparatus of claim 27 wherein said at least one protected bit is differentially coded with respect to a less protected bit of a previous transmit symbol.

29. The apparatus of claim 26 wherein said differentially coded bits comprises at least one unprotected bit.

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30. The method of claim 29 wherein said at least one unprotected bit is differentially coded with respect to a protected bit of a previous transmit symbol.

31. The apparatus of claim 25 further including a channel coder to channel code an

25   information sequence to generate said input sequence.

32.   The apparatus of claim 31 wherein said channel coder codes said information sequence using an unequal error protection scheme.

5   33.   The apparatus of claim 31 further comprising an interleaver to interleave coded bits output by said channel coder to generate said input sequence.

34.   The apparatus of claim 33 wherein said interleaver is a diagonal interleaver.

10   35.   The apparatus of claim 25 further comprising a modulator following said differential coder to modulate said transmit sequence onto a carrier.

36.   An apparatus for decoding a received sequence comprising:

        an equalizer to differentially decode a received sequence comprising a plurality of

                received symbols to generate an output sequence comprising a plurality of output

5   symbols, said received sequence having one or more differentially coded bits.

37.   The apparatus of claim 36 further comprising a demodulator to demodulate a received

signal to generate said received sequence.

10   38.   The apparatus of claim 37 wherein said demodulator and said differential decoder are

implemented as an equalizer that performs demodulation and differential decoding jointly.

39.   The apparatus of claim 38 further comprising a channel decoder to decode said output

sequence output from said differential decoder to generate a decoded sequence.

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40.   The apparatus of claim 39 wherein said demodulator comprises a multi-pass

demodulator that receives re-encoded bits fed back from said channel decoder, wherein said re-

encoded bits are used as pilot bits by said demodulator to demodulate said received signal.

20   41.   The apparatus of claim 36 wherein said differential decoder differentially decodes one or

more bits of a first received symbol with respect to one or more bits from previous received

symbols.

42. The apparatus of claim 41 wherein at least one differentially coded bit comprises a protected bit, and wherein said protected bit is differentially decoded with respect to a less protected bit of a previous received symbol.

5   43. The apparatus of claim 41 wherein at least one differentially coded bit comprises an unprotected bit, and wherein said unprotected bit is differentially decoded with respect to a protected bit.